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XRD9829REF
USER MANUAL

CIS 30-BIT COLOR SINGLE LINE SCANNER

EXAR Corporation, 48720 Kato Road, Fremont, CA 94538 • (510) 668-7000 • FAX (510) 668-7017

EVALUATION KIT PART LIST

This kit contains the following:

- XRD9829REF CIS 30-Bit Color Single Line Scanner
- XRD9829REF User Manual
- ScanIt 1.0 Software Installation Diskettes (2)
- XRD9829 Data Sheet
- Scan Targets (Black, White, Color)

FEATURES

- One line scanning functionality of XRD9829 with CANON 300 DPI CIS
- Easy use with most personal computers through Parallel Port Interface
- Simple way of loading the Serial Port of XRD9829 to adjust gain and offset
- Software ScanIt to view single line scan
- Optimized Layout with Four Layers

SYSTEM REQUIREMENTS

- Intel 486 compatible computer with Windows 95 operating system
- 8 MBytes system memory
- 25-pin D-shape parallel port receptacles
- 3 1/2" floppy disk drive

INTRODUCTION

The XRD9829REF is a demo system which includes a PCB design with a CANON CWB-30216G 300 DPI Color Contact Image Sensor (CIS). It demonstrates how to interface a CIS with EXAR's XRD9829, a 10-bit Linear CIS/CCD Sensor Signal Processor to get a single line scan. The XRD9829REF is designed to provide a signal path for the CIS output signals to be processed, digitized by the XRD9829 and transmitted to a personal computer. There are no software algorithms or hardware implementations to adjust for true color response.

The XRD9829REF board is loaded with the XRD9829, a Vantis MACH435, two FIFO SRAMs and peripheral circuits for the CIS. The MACH435, which is a CMOS Programmable Logic Device (CPLD) provides timing signals to the XRD9829, the SRAMs and the CIS. It also programs the XRD9829 to operate in the correct mode and adjust for gain and offset values. The XRD9829 processes the analog output from the CIS sensor, level-shifts and converts the signal into digital codes. The SRAMs gate the digitized data from the XRD9829 and stores the data temporarily. Controlled by the software, the SRAMs send the data through a parallel port connection to the PC and histograms of raw data are displayed in the monitor using the ScanIt software. A block diagram of the XRD9829REF is shown below in Figure 1.

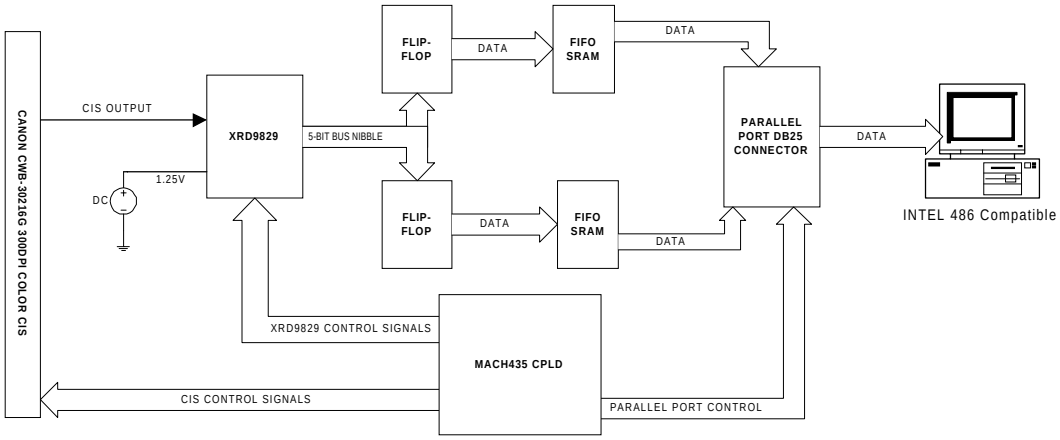


Figure 1. Block Diagram of XRD9829REF

The XRD9829 is a complete linear CIS or CCD sensor signal processor on a single monolithic chip. The XRD9829 includes a high speed 10-Bit ADC, a 6-Bit Programmable Gain Amplifier with gain adjustment of 1 to 10 and an 8-Bit programmable input referred offset calibration range of 800 mV. See the XRD9829EVAL User Manual / PCB board for evaluating the XRD9829 CIS / CCD signal processor chip.

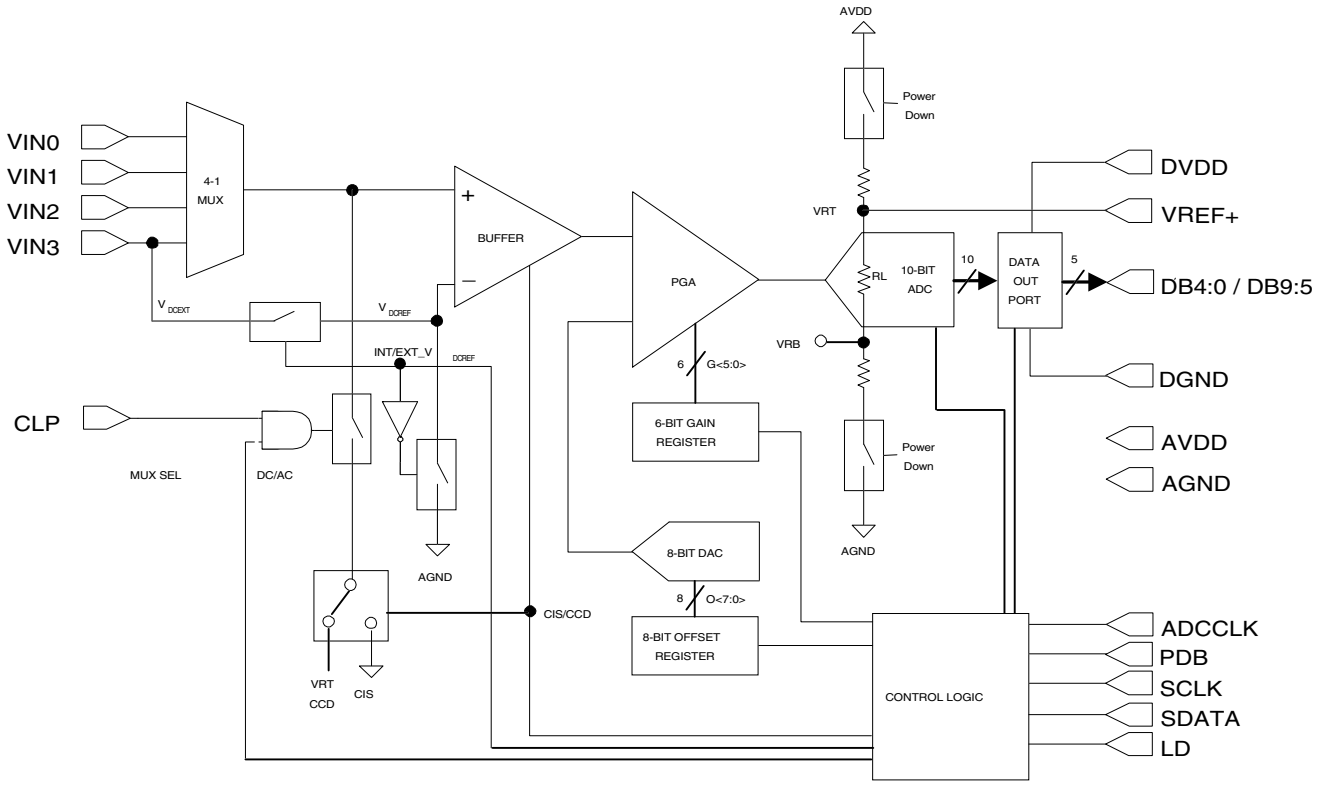


Figure 2. Functional Block Diagram of XRD9829

OPERATIONAL PROCEDURE

The routine listed below will first calibrate the photo response of the CIS using the XRD9829. After calibration, the XRD9829REF can be used to scan any color target to show CIS non-color corrected response. (Color correction is typically done in the digital asic.)

How to Run the XRD9829REF Demonstration:

1. Make sure the computer is powered off and the AC power adapter is disconnected from a wall outlet
2. Connect the parallel port cable to the printer port of the computer
3. Connect the AC power adapter into a wall outlet
4. Turn on the computer and activate Windows 95

Loading EXAR Software

5. Load the diskette labeled ScanIt 1.0 Disk # 1 into the floppy drive
6. Select the Start menu in the program manager and choose RUN
7. Inside the small pop-up window, type: A:\setup
8. Follow the instructions to finish software installation

Parallel Port Configurations

9. Confirm the parallel port address as follows:

    a. Select the Start Menu, choose Settings, then choose Control Panel
    b. From the Control Panel window which pops up, double-click on System
    c. In the System Properties window, select Device Manager
    d. From the Device Manager window, double-click on Ports (COM & LPT)
    e. Double-click on Printer Port (LPT1). If you can not find it, please goto Step 10
    f. From the pop-up window, select Resources
    g. Verify the Input/Output Range is set to 0378 - 037F
    h. If the range is not correct, clear the Use Automatic Settings check box by clicking it
    i. Choose correct address which is 0378 by default and click OK
    j. Re-start the computer as advised

10. If you do not have a Printer Port configured on your computer, please follow the steps listed below:

    a. From the Control Panel window which pops up, double-click on Add New Hardware
    b. From the pop-up window, click the Next > button
    c. Select 'No' when prompted for 'Do you want Windows to search for your new hardware?', then click the Next > button
    d. Choose Ports (COM & LPT), then click the Next > button
    e. Choose Printer Port, then click the Next > button
    f. Make a note of the Input/Output Range of Printer Port of your computer and click OK.
    g. You will use these values later when configure the ScanIt software
    h. Re-start the computer as advised

Offset Adjustment With a Black Target

11. Set the dip switches located on the side panel of the scanner to 1100010000 as shown in Figure 2 and push the Serial Port button which is located on the front panel of the demo system. This will reset the XRD9829.

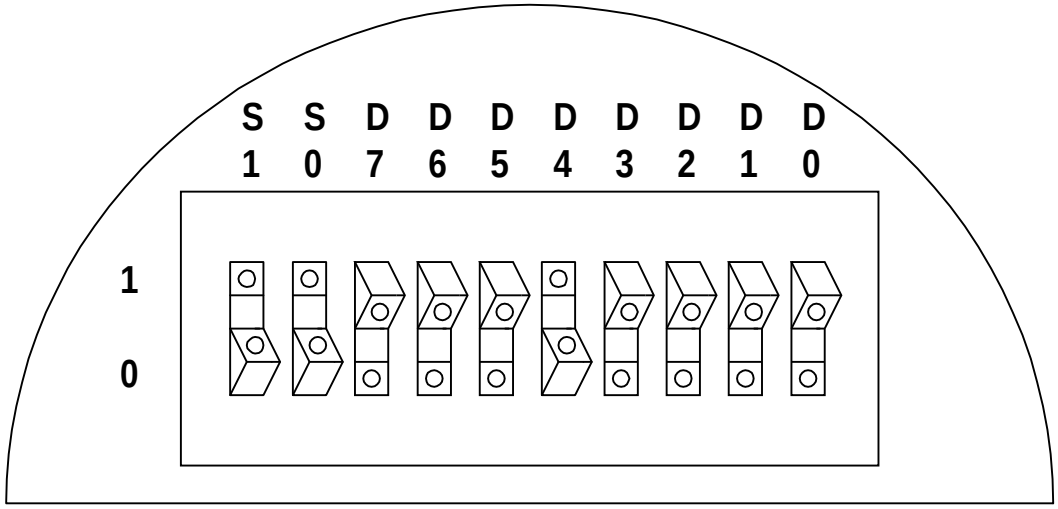


Figure 3. Dip Switches Set to Value 1100010000 to Reset the XRD9829

Control Registers

Function (Register S1/S0)	D7	D6	D5	D4	D3	D2	D1	D0	Power-up State (Note 1)
Gain (00) (MSB)	G5	G4	G3	G2	G1	G0	X	X (LSB)	000000XX
Offset	O7	O6	O5	O4	O3	O2	O1	O0	01000000
(01) Mode	(MSB) X	X	V_{RT}	INPUT DC	DC/AC	CIS/CCD	MUX SEL	(LSB) MUX SEL	XX000000
(10)			0: INTERNAL 1: EXTERNAL 0:INTERNAL (V_{DCREF}= AGND) 1: EXTERNAL (V_{DCREF}=V_{DCEXT})	REFERENCE (V_{DCREF})	0: DC 1: AC	0: CIS 1: CCD 0 0: VIN0 0 1: VIN1 1 0: VIN2 1 1: VIN3	0 0: VIN0 0 1: VIN1 1 0: VIN2 1 1: VIN3		
Mode & Test (11)	X	X	X	DIGITAL RESET 0: NO RESET 1: RESET (REGISTERS ARE RESET TO POWER-UP STATES) BECOMES AN OUTPUT)	TEST3 0: TEST3 DISABLED 1: OUTPUT OF BUFFER TIED TO VIN3 PIN (VIN3 PIN (VIN2 PIN BECOMES AN OUTPUT)	TEST2 0: TEST2 DISABLED 1: OUTPUT OF PGA TIED TO VIN2 PIN (PGA OUTPUT DISCONNECTED FROM INPUT OF ADC)	TEST1 0: TEST1 DISABLED 1: VIN1 PIN TIED TO INPUT OF ADC	X	XXX0000X

Table 1. Control Register Description for XRD9829

Note:

[1] These are the control register settings upon initial power–up. The previous register settings are retained following a logic power-down initiated by the PDB signal.

12. Select the Start Menu, choose Programs, then choose XRD9829REF icon

13. A window will pop up as shown below. The upper window shows the Plot of Captured Data and the lower window shows the Histogram of data. Figure 3 shows the pop-up window when ScanIt is first

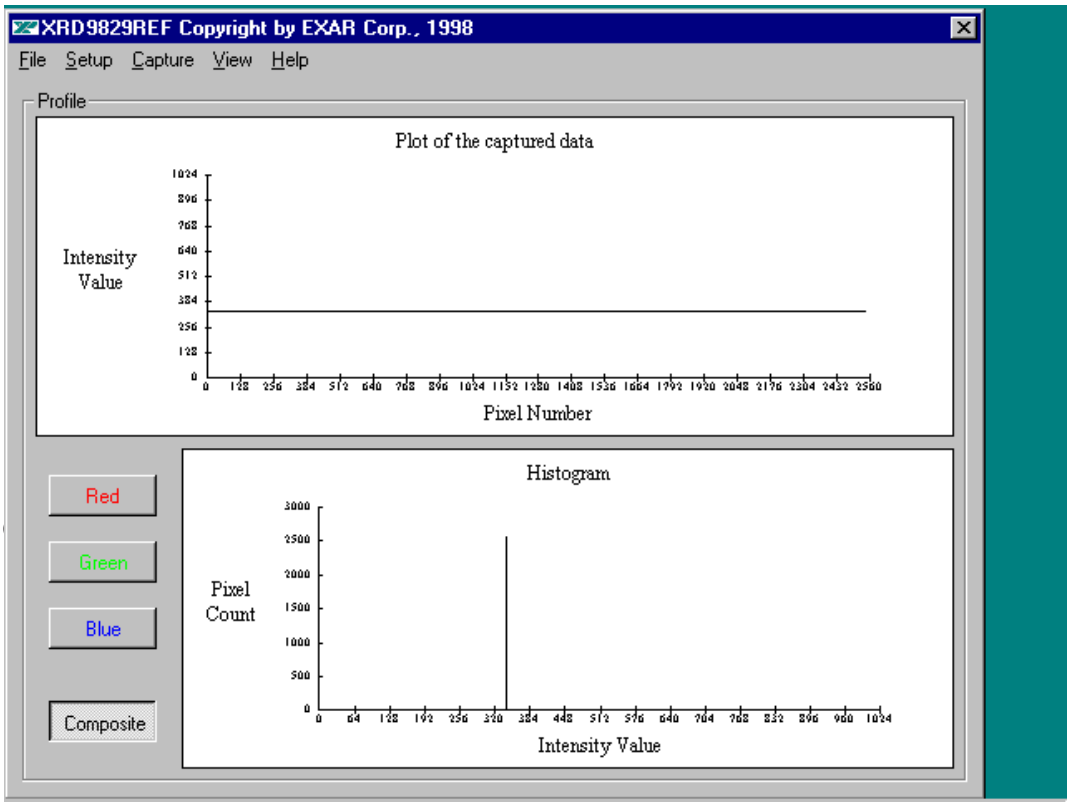


Figure 4. ScanIt Software Window Before Scanning

14. Select SETUP from the pull-down menu and choose I/O ADDRESS. In the window that pops up, type in the Input/Output Range of Printer Port of your computer. The default setting is 378H.

15. Pick the black target out from the kit and put it on a flat area. Place the XRD9829REF on top of the black target with the CIS sensor facing downwards. From the CAPTURE menu select SNAP SHOT for a single line scan of the black target with the dip switches set to zero. A typical result of a black target scan is shown below:

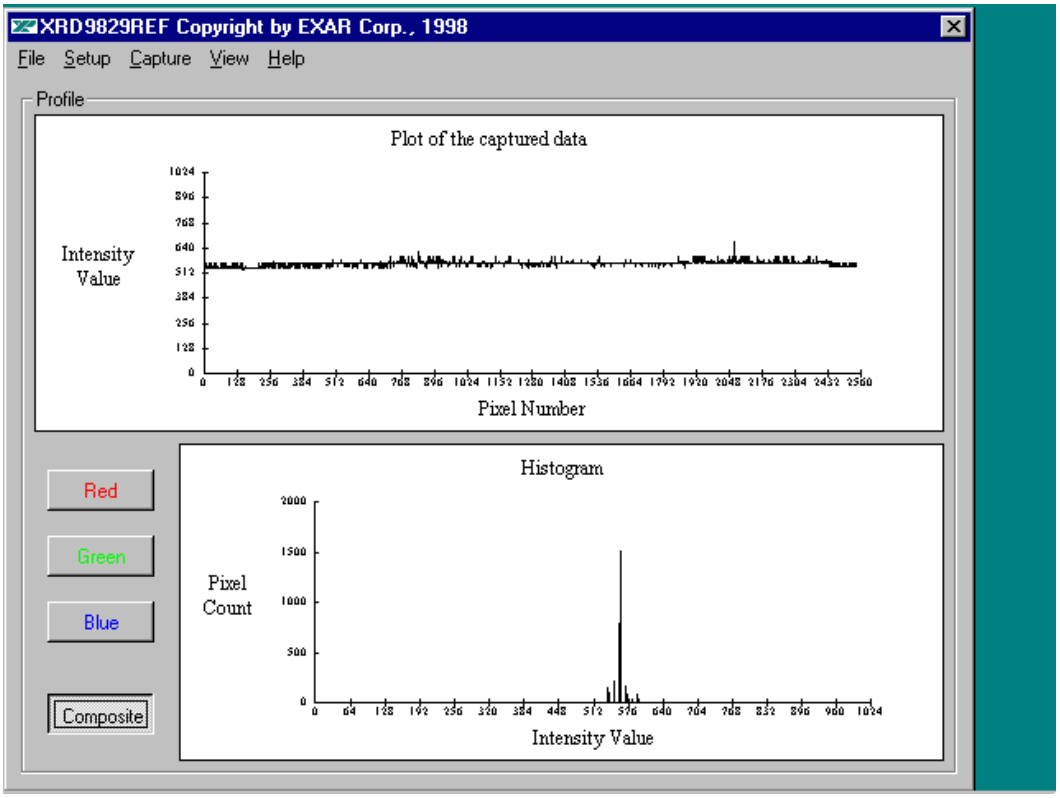


Figure 5. Non-calibrated Black Target Scan

16. Set the dip switches to 1000010000 to select the external DC reference for the 1.25V global offset adjustment. Push the Serial Port button. The XRD9829 will subtract whatever voltage appears on Pin 16, in this case, 1.25V, from the input. From the CAPTURE menu select SNAP SHOT. A typical result of the global offset adjustment is shown below. Please notice that the black code value has moved down.

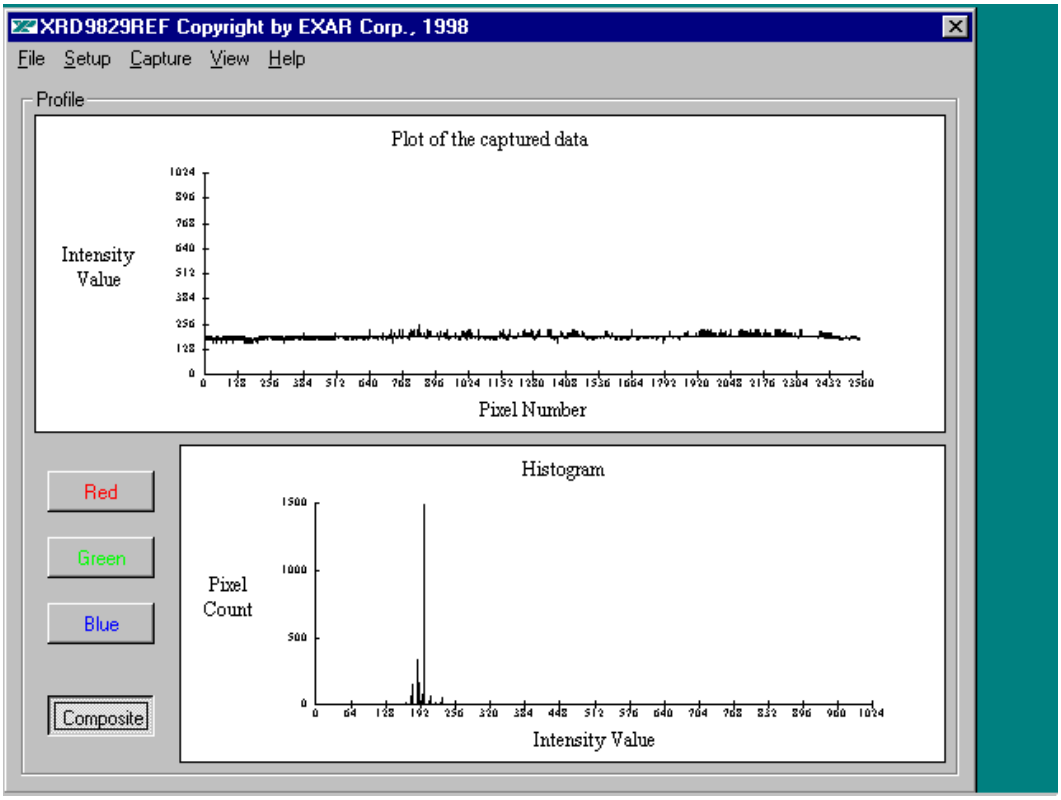


Figure 6. Black Target Scan After Global Offset Adjust

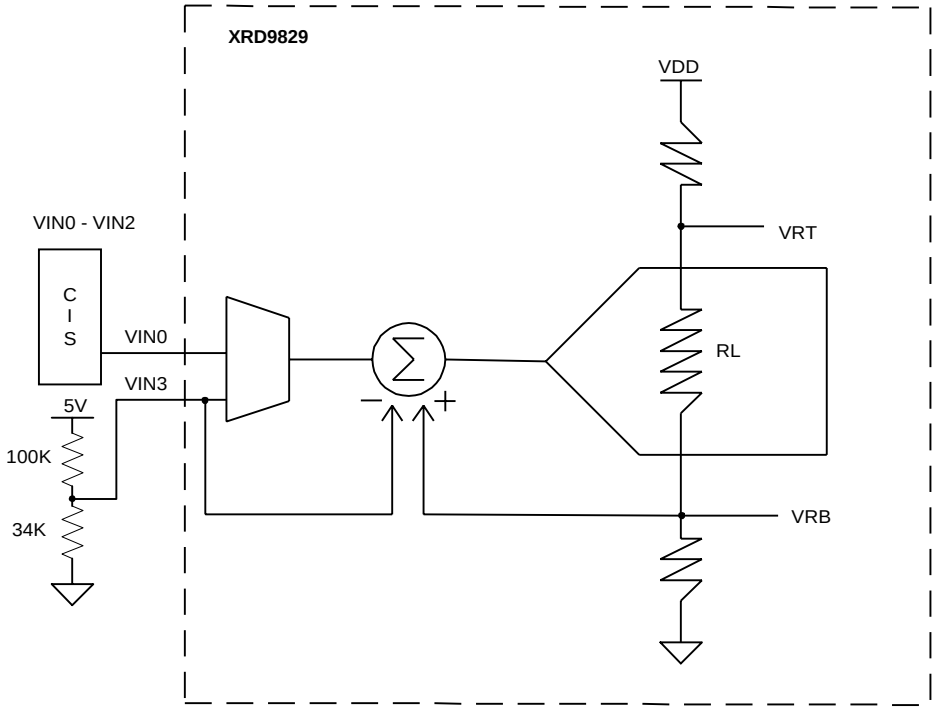


Figure 7. Simplified Block Diagram Showing Global Offset Adjustment by XRD9829 Using External Resistor Ladder

17. Set the dip switches to 0111000000 to select the internal offset DAC for fine offset adjustment. Push the Serial Port button. From the CAPTURE menu select SNAP SHOT. The offset should now move the output of the CIS to almost zero scale. Please refer to data sheet for offset adjustment. A typical result of the fine offset adjustment is shown below.

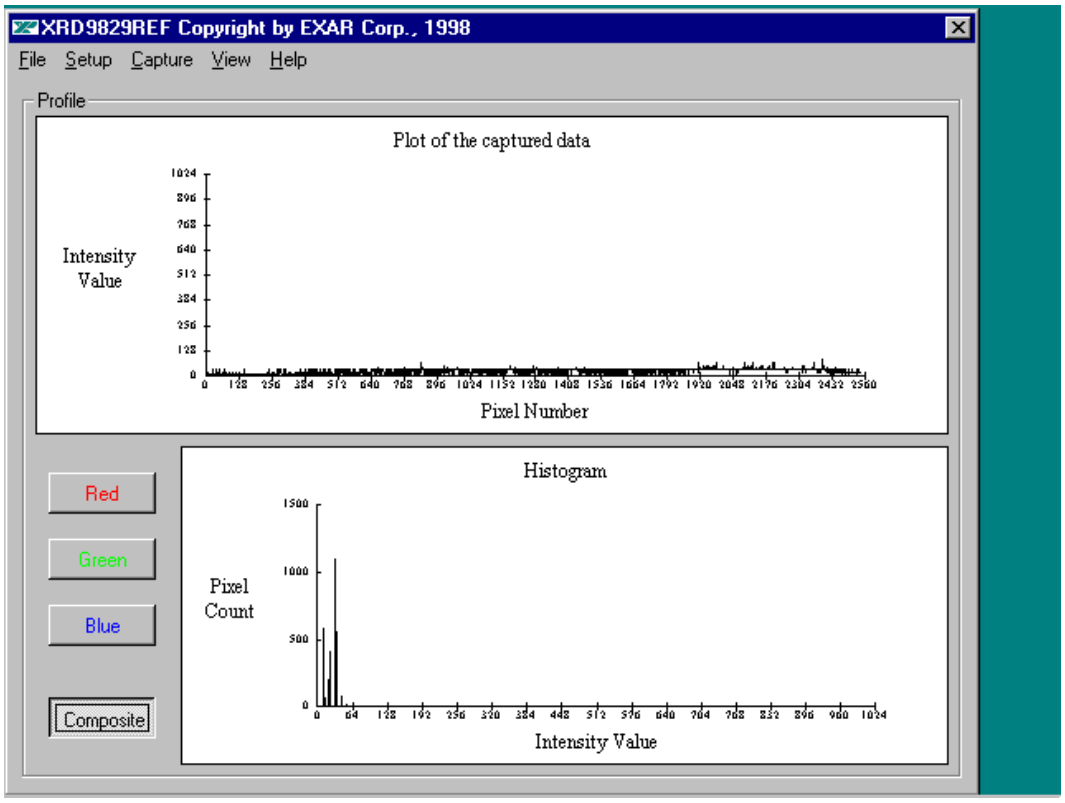


Figure 8. Black Target Scan After Global and Fine Adjust

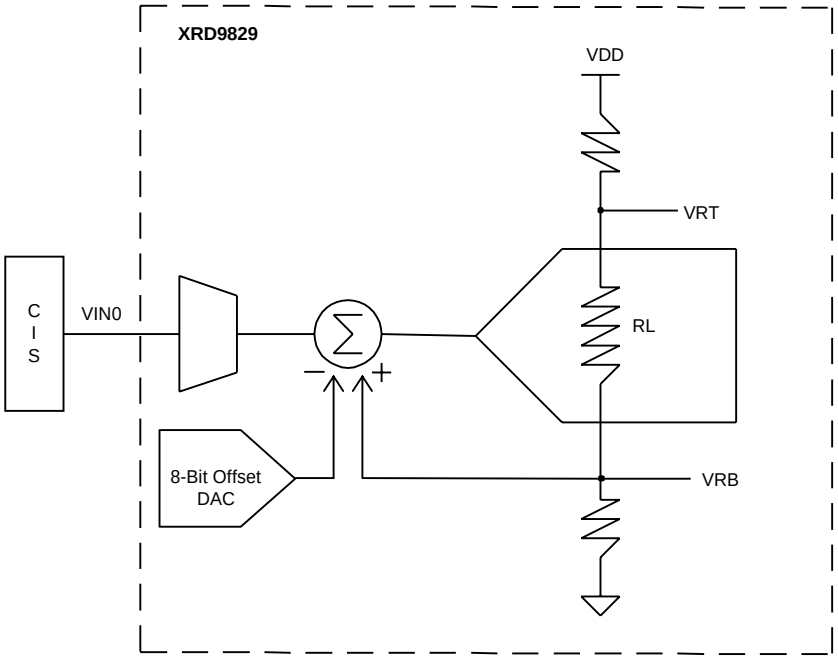


Figure 9. Simplified Block Diagram Showing Fine Offset Adjustment by XRD9829

18. Switch the black target to the enclosed white target. From the CAPTURE menu select SNAP SHOT for a single line scan of the white target. A typical result of a white target is shown below.

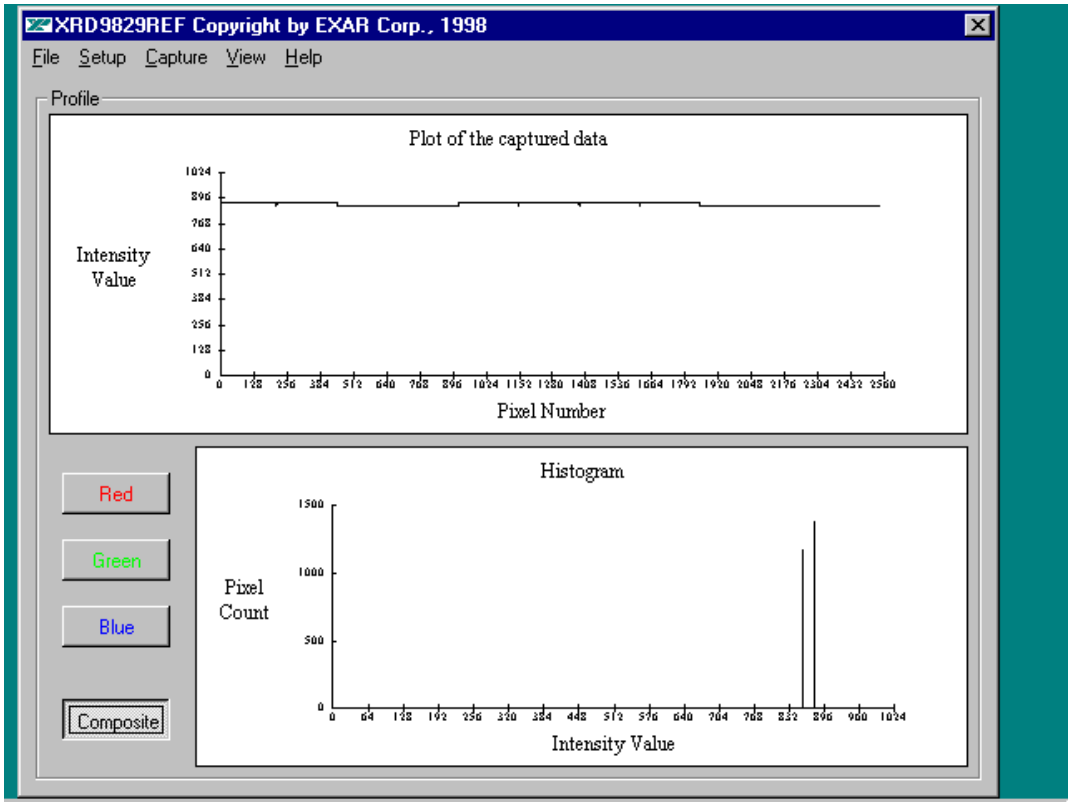


Figure 10. White Target Scan Without Gain Adjustment

19. Set the dip switches to 0000000100 to select the desired gain. Push the Serial Port button. From the CAPTURE menu select SNAP SHOT. The gain should move the output of the CIS to almost full scale. Please refer to data sheet for further gain adjustment and optimal values of dip switches for your scanner. A typical result of the white target with gain adjustment is shown below.

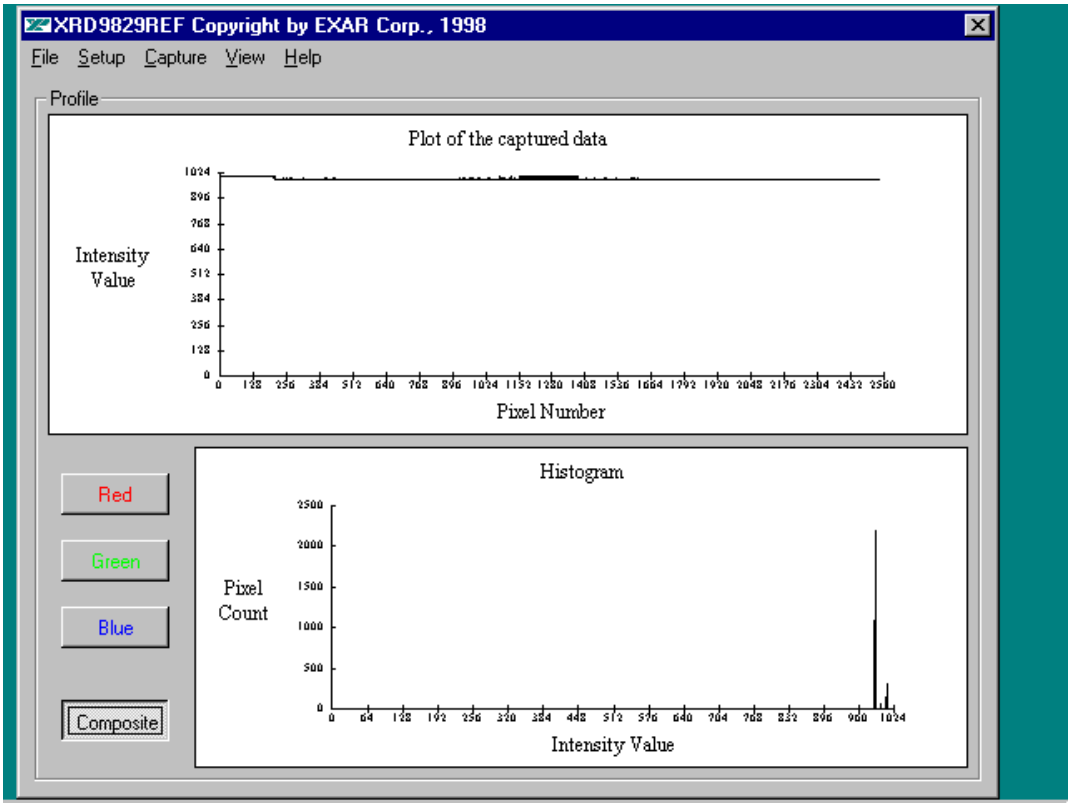


Figure 11. White Target Scan After Gain Adjustment

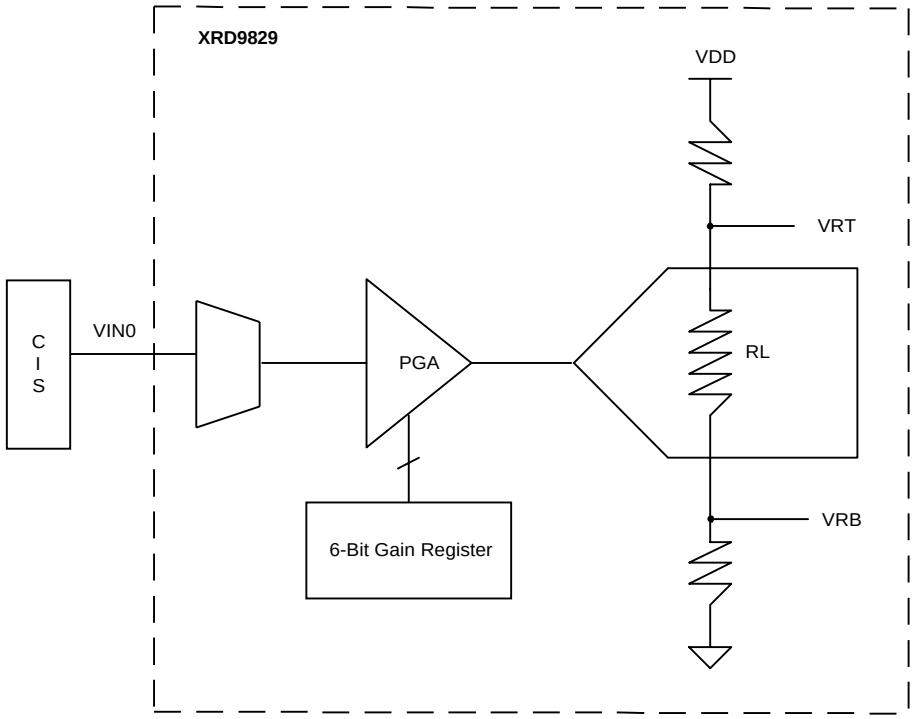


Figure 12. Simplied Block Diagram Showing Gain Adjustment by XRD9829

20. Once the XRD9829 has been fully calibrated, any target can be scanned. For example: Scan a gray scale to demonstrate the stair step response or a color target for color responsitivity

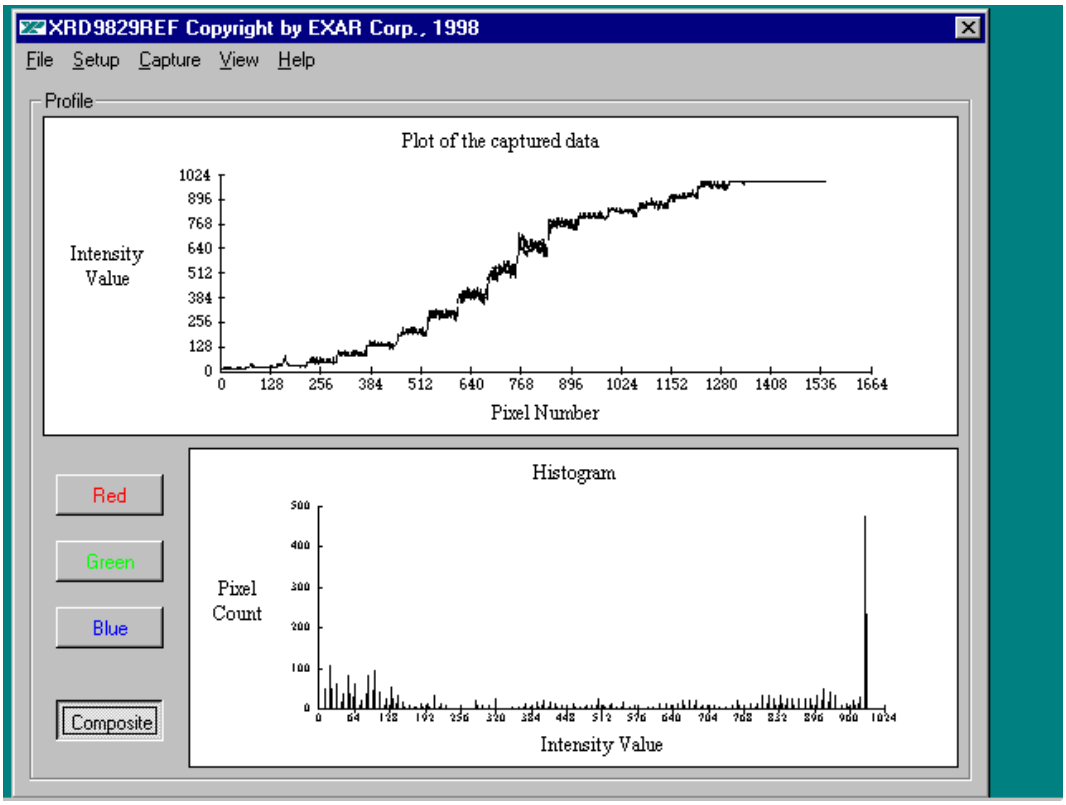
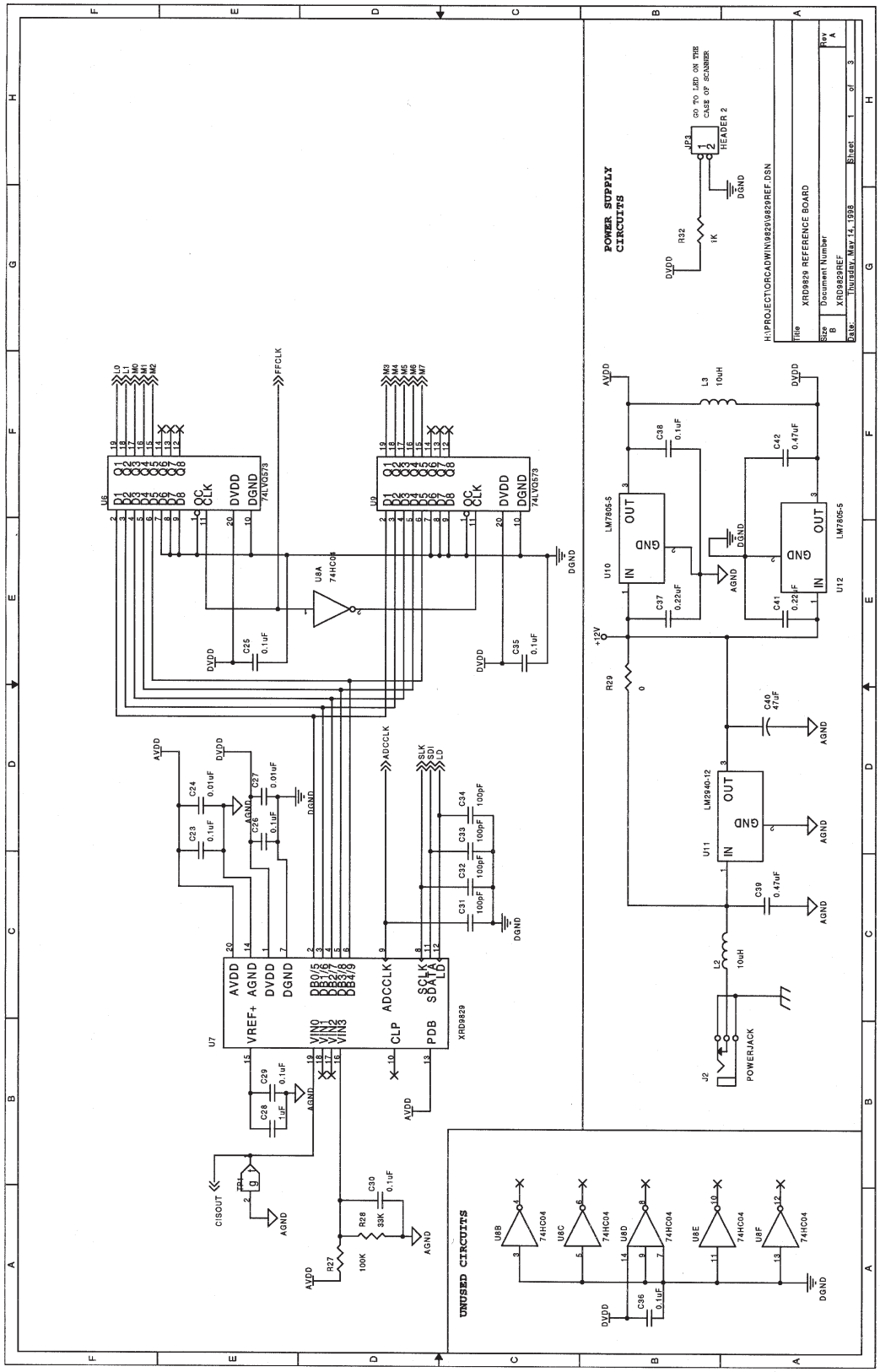


Figure 13. Gray-scale Target Scan

Important:

1. *If at any time an unexpected result is shown or the demo system seems to not working, please pull the AC adapter out from the wall outlet to cycle power. Start the procedures again from Step 11.*

2. *Keep the scanner away from other electrical equipment, power cords, light dimmers etc. as stray electrical fields can end up in the digitized data.*



Schematics for XRD9829REF
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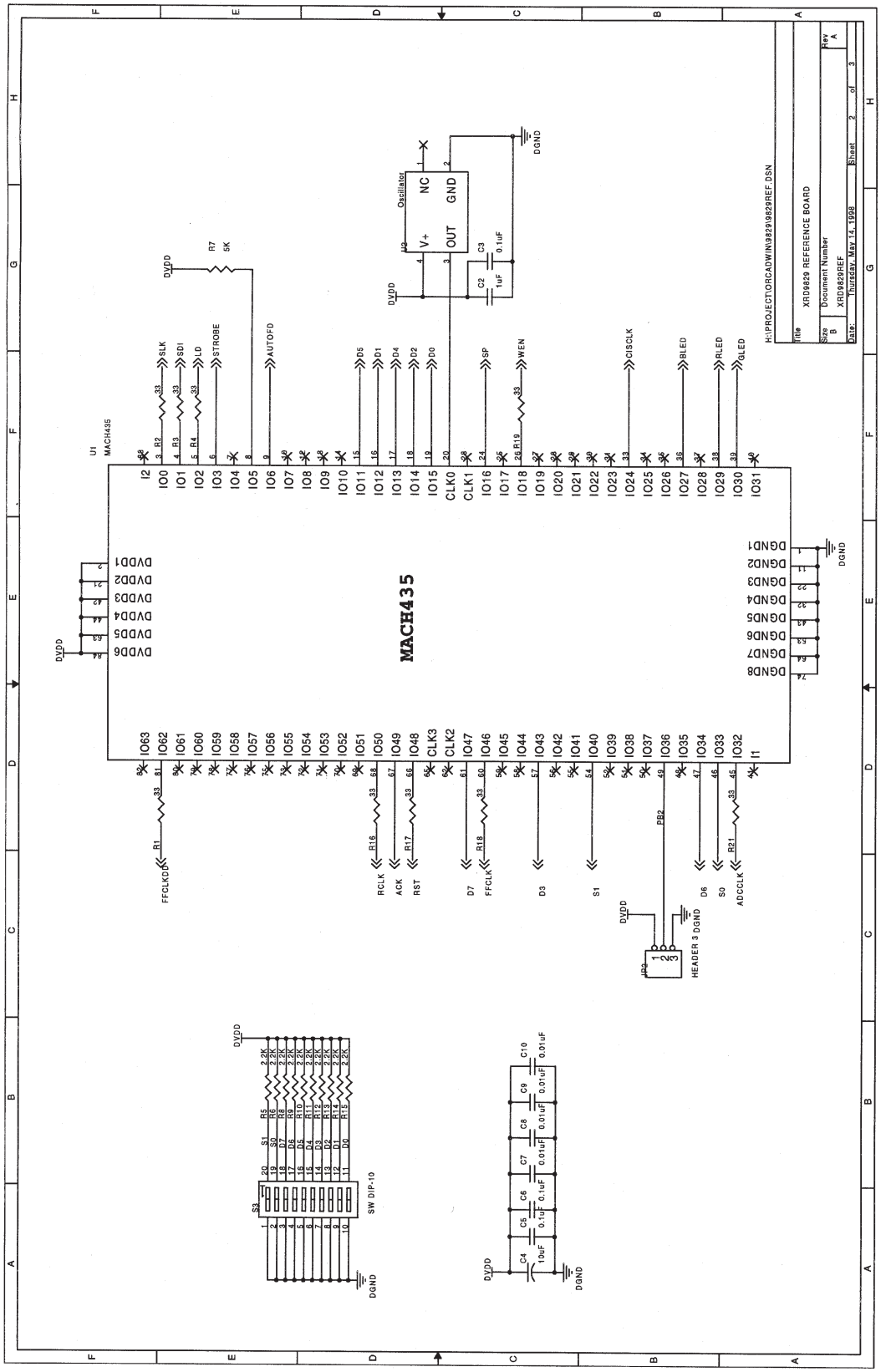

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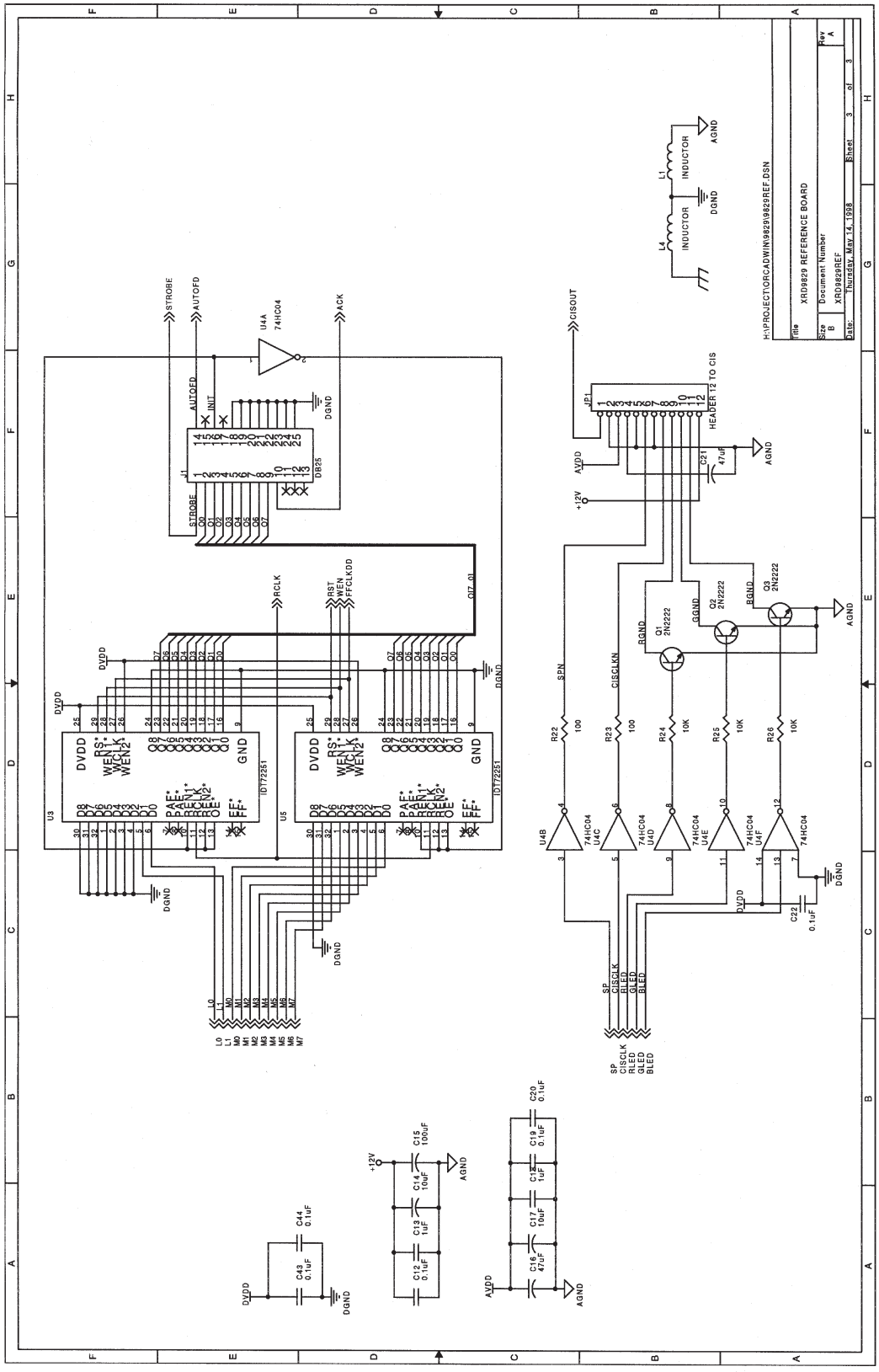

Schematics for XRD9829REF
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